

CLAIMS:

1. A power amplifier module comprising:
a first amplifier to amplify a voice call for transmission over a first output branch;
a second amplifier to amplify a data call for transmission over a second output branch;
a phase shifter to generate a phase-shifted version of the voice call; and
a switch to decouple the data call from the second amplifier and couple the phase-shifted version of the voice call to the second amplifier when required transmit power for the voice call exceeds the threshold.
2. The power amplifier module of claim 1, further comprising a coupler circuit to combine the first and second output branches for transmission over a wireless interface associated with a mobile wireless communication device.
3. The power amplifier module of claim 2, wherein the coupler circuit includes a 90-degree hybrid coupler that combines the first and second output branches.
4. The power amplifier module of claim 1, further comprising a power control unit to control the phase shifter and the switch based on required transmit power for the voice call.
5. The power amplifier module of claim 4, wherein the power control unit monitors power control data, and controls the phase shifter and the switch in response to the power control data.
6. The power amplifier module of claim 4, wherein the power control unit controls the switch to couple the data call to the second amplifier and decouple the voice call from the second amplifier when the required transmit power is less than the threshold.

7. The power amplifier module of claim 1, wherein the voice call and the phase-shifted voice call are substantially identical except for the phase shift.

8. The power amplifier module of claim 1, wherein the phase shifter phase-shifts the voice call approximately 90 degrees.

9. A power amplifier module comprising:

a first amplifier to amplify a voice call for transmission over a first output branch;

a second amplifier to amplify a data call for transmission over a second output branch;

a coupler circuit to combine the first and second output branches for transmission over a wireless interface associated with a mobile wireless communication device; and

means for coupling a phase-shifted version of the voice call to the second amplifier when required transmit power for the voice call exceeds a threshold.

10. The power amplifier module of claim 9, wherein the coupler circuit includes a 90-degree hybrid coupler that combines the first and second output branches.

11. The power amplifier module of claim 9, wherein the coupling means includes a switch to decouple the data call from the second amplifier and couple the phase-shifted version of the voice call to the second amplifier when required transmit power for the voice call exceeds the threshold.

12. The power amplifier module of claim 9, further comprising a phase shifter to generate the phase-shifted version of the voice call when required transmit power for the voice call exceeds the threshold.

13. The power amplifier module of claim 12, wherein the phase shifter phase-shifts the voice call approximately 90 degrees.

14. The power amplifier module of claim 9, further comprising a power control unit to control the coupling means based on the required transmit power for the voice call.

15. The power amplifier module of claim 14, wherein the power control unit monitors power control data, and controls the coupling means in response to the power control data.

16. The power amplifier module of claim 9, wherein the power control unit controls the coupling means to couple the data call to the second amplifier and decouple the voice call from the second amplifier when the required transmit power is less than the threshold.

17. The power amplifier module of claim 9, wherein the voice call and the phase-shifted voice call are substantially identical except for the phase shift.

18. A power amplifier/antenna module comprising:

a first amplifier to amplify a voice call for transmission over a first output branch;

a second amplifier to amplify a data call for transmission over a second output branch;

a radio frequency antenna for a wireless interface associated with a mobile wireless communication device; and

a coupler circuit to combine the first and second output branches for transmission over the antenna.

19. The power amplifier/antenna module of claim 18, further comprising:

a phase shifter to generate a phase-shifted version of the voice call when required transmit power for the voice call exceeds a threshold; and

a switch to decouple the data call from the second amplifier and couple the phase-shifted version of the voice call to the second amplifier when required transmit power for the voice call exceeds the threshold.

20. The power amplifier/antenna module of claim 19, wherein the coupler circuit includes a 90-degree hybrid coupler that combines the first and second output branches.

21. The power amplifier/antenna module of claim 19, wherein the voice call and the phase-shifted voice call are substantially identical except for the phase shift.

22. The power amplifier/antenna module of claim 19, wherein the phase shifter phase-shifts the voice call approximately 90 degrees.

23. A digital signal processing module comprising:

a voice call transmission unit to generate a voice call for transmission via a first output branch;

a data call transmission unit to generate a data call for transmission via a second output branch;

a phase shifter to generate a phase-shifted version of the voice call; and

a switch to decouple the data call from the second output branch and couple the phase-shifted version of the voice call to the second output branch when required transmit power for the voice call exceeds the threshold.

24. The digital signal processing module of claim 23, further comprising a power control unit to control the phase shifter and the switch based on required transmit power for the voice call.

25. The digital signal processing module of claim 24, wherein the power control unit monitors power control data, and controls the phase shifter and the switch in response to the power control data.

26. The digital signal processing module of claim 25, wherein the power control unit controls the switch to couple the data call to the second amplifier and decouple the voice call from the second amplifier when the required transmit power is less than the threshold.

27. The digital signal processing module of claim 23, wherein the voice call and the phase-shifted voice call are substantially identical except for the phase shift.

28. The digital signal processing module of claim 23, wherein the phase shifter phase-shifts the voice call approximately 90 degrees.

29. A method comprising:

transmitting a voice call via a first output branch;

transmitting a data call via a second output branch;

combining the first and second output branches for transmission over a wireless interface associated with a mobile wireless communication device; and

transmitting the voice call via both the first and second output branches when required transmit power for the voice call exceeds a threshold.

30. The method of claim 29, further comprising phase-shifting the voice call to produce a phase-shifted voice call, wherein transmitting the voice call via both the first and second output branches includes transmitting the voice call via the first output branch and transmitting the phase-shifted voice call via the second output branch.

31. The method of claim 30, wherein the voice call and the phase-shifted voice call are substantially identical except for the phase shift.

32. The method of claim 30, wherein phase-shifting the voice call includes phase-shifting the voice call approximately 90 degrees.

33. The method of claim 32, further comprising combining the first and second output branches via a 90-degree hybrid coupler.

34. The method of claim 29, further comprising:

monitoring power control data; and

increasing the transmit power of the voice call in response to the power control data.

35. The method of claim 29, wherein transmitting the voice call via both the first and second output branches includes decoupling the data call from the second output branch and coupling the voice call to the second output branch.

36. The method of claim 29, wherein transmitting the voice call via both the first and second output branches includes digitally generating a second voice call substantially identical to the first voice call and coupling the second voice call to the second output branch.

37. The method of claim 29, further comprising coupling the data call to the second output branch and decoupling the voice call from the second output branch when the required transmit power is less than the threshold.

38. The method of claim 29, further comprising:

amplifying the voice call transmitted via the first output branch with a first power amplifier; and

amplifying the voice call transmitted via the second output with a second power amplifier,

wherein combining the first and second output branches includes combining the first and second amplified voice calls.

39. The method of claim 38, further comprising:

transmitting the voice call at a first carrier frequency; and

transmitting the data call at a second carrier frequency.

40. A mobile wireless communication device comprising:

a first output branch for transmission of a voice call;

a second output branch for transmission of a data call;

a coupler circuit to combine the first and second output branches for transmission over a wireless interface associated with a mobile wireless communication device; and

a power control unit to direct transmission of the voice call via both the first and second output branches when required transmit power for the voice call exceeds a threshold.

41. The device of claim 40, further comprising a phase shifter to phase-shift the voice call to produce a phase-shifted voice call, wherein the transmit controller transmits the voice call via the first output branch and transmits the phase-shifted voice call via the second output branch.

42. The device of claim 41, wherein the voice call and the phase-shifted voice call are substantially identical except for the phase shift.

43. The device of claim 41, wherein the phase shifter phase-shifts the voice call approximately 90 degrees.

44. The device of claim 41, wherein the coupler circuit includes a 90-degree hybrid coupler that combines the first and second output branches.

45. The device of claim 40, wherein the power control unit monitors power control data, and increases the transmit power of the voice call in response to the power control data.

46. The device of claim 40, wherein the power control unit directs transmission of the voice call via both the first and second output branches by decoupling the data call from the second output branch and coupling the voice call to the second output branch.

47. The device of claim 40, wherein the power control unit directs transmission of the voice call via both the first and second output branches by directing digital generation of a second voice call substantially identical to the first voice call and coupling the second voice call to the second output branch.

48. The device of claim 40, wherein the power control unit directs coupling of the data call to the second output branch and decoupling of the voice call from the second output branch when the required transmit power is less than the threshold.

49. The device of claim 40, further comprising:

a first power amplifier to amplify the voice call transmitted via the first output branch; and

a second power amplifier to amplify the voice call transmitted via the second output,

wherein the coupler circuit combines the first and second amplified voice calls.

50. The device of claim 49, further comprising:

a first baseband to radio frequency processor to convert the voice call from a baseband frequency to a first carrier frequency; and

a second baseband to radio frequency processor to convert the data call from a baseband frequency to a second carrier frequency.

51. The device of claim 50, wherein the phase shifter is coupled to the output branch of the first baseband to radio frequency processor.

52. A method comprising:

transmitting a voice call at a first transmit carrier frequency via a first output branch;

transmitting a data call at a second transmit carrier frequency via a second output branch;

controlling a transmit power of the voice call in response to power control data; and

dropping the data call and transmitting the voice call via both the first and second output branches at the first transmit carrier frequency when the transmit power of the voice call exceeds a threshold.

53. The method of claim 52, further comprising phase-shifting the voice call to produce a phase-shifted voice call, wherein transmitting the voice call via both the first and second

output branches includes transmitting the voice call via the first output branch and transmitting the phase-shifted voice call via the second output branch.

54. The method of claim 53, wherein phase-shifting the voice call includes phase-shifting the voice call approximately 90 degrees.

55. A mobile wireless communication device comprising:

a first output branch for transmission of a voice call at a first transmit carrier frequency;

a second output branch for transmission of a data call at a second transmit frequency; and

a power control unit to control a transmit power of the voice call in response to power control data, wherein the power control unit drops the data call and directs transmission of the voice call via both the first and second output branches at the first transmit carrier frequency when the transmit power of the voice call exceeds a threshold.

56. The device of claim 55, further comprising a phase shifter to phase-shift the voice call to produce a phase-shifted voice call, wherein the transmit controller transmits the voice call via the first output branch and transmits the phase-shifted voice call via the second output branch.

57. The device of claim 56, wherein the phase shifter phase-shifts the voice call approximately 90 degrees.

58. A wireless communication device comprising:

means for transmitting a voice call via a first output branch;

means for transmitting a data call via a second output branch;

means for combining the first and second output branches for transmission over a wireless interface associated with a mobile wireless communication device; and

means for transmitting the voice call via both the first and second output branches when required transmit power for the voice call exceeds a threshold.

59. The device of claim 58, further comprising means for phase-shifting the voice call to produce a phase-shifted voice call, wherein the means for transmitting the voice call via both the first and second output branches includes means for transmitting the voice call via the first output branch and transmitting the phase-shifted voice call via the second output branch.

60. The device of claim 59, wherein the voice call and the phase-shifted voice call are substantially identical except for the phase shift.

61. The device of claim 59, wherein the phase-shifting means phase-shifts the voice call approximately 90 degrees.

62. The device of claim 61, further a 90-degree hybrid coupler for combining the first and second output branches.

63. The device of claim 58, wherein the voice call has a first carrier frequency, and the data call has a second carrier frequency different from the first carrier frequency.

64. A power amplifier module comprising:
a first amplifier to amplify a voice call for transmission over a first output branch;
a second amplifier to amplify a data call for transmission over a second output branch;

a first hybrid coupler to pass the voice call to the first amplifier and generate a phase-shifted version of the voice call;

a switch device to couple the phase-shifted version of the voice call to the second amplifier, and decouple the data call from the second amplifier when required transmit power for the voice call exceeds a threshold; and

a second hybrid coupler to combine the first and second output branches for transmission over a wireless interface associated with a mobile wireless communication device.

65. The power amplifier module of claim 64, wherein the first hybrid coupler includes a 90-degree hybrid coupler, and the second hybrid coupler includes a 90-degree hybrid coupler.

66. The power amplifier module of claim 64, further comprising a power control unit to control the switch device based on required transmit power for the voice call.

67. The power amplifier module of claim 66, wherein the power control unit monitors power control data, and controls the switch device in response to the power control data.

68. The power amplifier module of claim 66, wherein the power control unit controls the switch device to couple the data call to the second amplifier when the required transmit power is less than the threshold.